**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

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| Applicants: Richard W. Citta et al. | ) |
| Serial No.: 10/815,335 | ) |
| Filed: April 1, 2004 | ) |
| For: **CODE ENHANCED EQUALIZATION BASED UPON A RELIABILITY FACTOR** | ) |
| Group Art Unit: 2611 | ) |
| Examiner: H. Singh | ) |
| Attorney Docket No.: 7168DIV 2 (P01,0447-02) | ) |
| Confirmation No.: 7549 | ) |

**CORRECTED APPELLANT'S BRIEF**

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to the provisions of 37 CFR §41.37, and to the Notification of Non-Compliant Appeal Brief mailed on February 21, 2008, Appellants submit this Corrected Appeal Brief. This Corrected Appeal Brief responds to the two objections to the originally filed Appeal Brief as indicated in the Notification. First, the section relating to the summary of the claimed

subject matter separately refers to the independent claims by claim number. The mapping between claims and the specification as set out below is not intended to be limiting but is provided only as examples. Second, there are two ground of rejections and each is argued separately under a corresponding heading.

1. Real Party in Interest

The real party in interest is Zenith Electronics Corporation of Lincolnshire, IL.

2. Related Appeals and Interferences

There are no other appeals or interferences known to Appellants, Appellants' legal representatives or assignees which will directly affect or be affected by or have a bearing on the Board's decision in the pending appeal.

3. Status of Claims

Claims 1-59 are cancelled. Claims 60-84 are rejected and are appealed.

4. Status of Amendments

All amendments have been entered.

5. Summary of Claimed Subject Matter

Independent claim 60 recites a code vector that is disclosed by way of example at page 5, line 13 through page 10, line 21 of the present application. Independent claim 73 recites a code vector that is disclosed by way of example at page 5, line 13 through page 10, line 21 of the present application. Independent claim 79 recites a

code vector that is disclosed by way of example at page 5, line 13 through page 10, line 21 of the present application.

If the code vector, for example, has a length of sixteen, then there are 256 different Kerdock code vectors, although other types of code vectors could be used in connection with the present invention.

An example of a code vector having a length of sixteen is shown in Figure 2.

If one of these 256 code vectors is selected as a reference code vector, then 112 of these 256 code vectors have a distance of six from the reference code vector, 30 of these 256 code vectors have a distance of eight from the reference code vector, 112 of these 256 code vectors have a distance of ten from the reference code vector, and only one of these 256 code vectors has a distance of sixteen from the reference code vector.

The reference code vector, the 30 code vectors which have a distance of eight from the reference code vector, and the code vector which has a distance of sixteen from the reference code vector are selected as a coset. The reference code vector is designated as the coset leader of the coset. Because each code vector in the coset has a complement in the coset, a coset may be divided into first and second groups of code vectors, where each group contains sixteen code vectors, and where each code vector in the first group has a complement in the second group. Therefore, it is useful to envision a coset as containing sixteen code vectors, where each code vector can be either positive or negative.

The 256 code vectors may be similarly divided into seven more cosets, each having a coset leader, so

that there are a total of eight cosets. As indicated above, the code vectors in each of these cosets are referred to, for example, as Kerdock code vectors.

An encoder 12 shown in Figure 1 encodes each group of data bits as a corresponding one of these code vectors. A modulator 14 modulates the code vectors onto a carrier. The code vectors are then transmitted into the channel.

Further, as to independent claim 60, and as disclosed on page 10, line 22 through page 15, line 24 of the present application, a receiver 20 receives a code vector from the channel. As to independent claim 73, and as disclosed on page 10, line 22 through page 15, line 24 of the present application, the receiver 20 receives a code vector from the channel. As to independent claim 79, and as disclosed on page 10, line 22 through page 15, line 24 of the present application, the receiver 20 receives a code vector from the channel.

A demodulator 22 of the receiver 20 demodulates the code vector, an equalizer 24 equalizes the code vector, and a decoder 26 decodes the code vector to recover the transmitted data.

An encoder 32 re-encodes the data from the output of the decoder 26. A summer 34 subtracts the output of the encoder 32 from the input to the decoder 26 to form an error e. A multiplier 36 scales the error e by a reliability factor r. The scaled error (re) is supplied to an LMS adaptive control 38. Also supplied to the LMS adaptive control 38 is a complex conjugated version of the output of the demodulator 22 derived by a complex conjugator 40. The output of the LMS adaptive control 38 is based on the complex conjugated version of

the output of the demodulator 22, the scaled error (re), and a value $\alpha$. The value $\alpha$ is less than one and ensures that changes to the tap values of the equalizer 24 are made in incremental steps. The output of the LMS adaptive control 38 is added to the tap values used by the equalizer 24.

The decoder 26 implements a correlation between each of the coset leaders and a received code vector. This processing produces various correlation peaks as shown in Figure 5 for each coset leader. The largest peak represents the transmitted code vector which is decoded to recover the data.

The value of the reliability factor r, for example, is based on the largest peak, or is based on the difference between the largest peak and the next largest peak, or is based on the difference between the squares of the largest peak and the next largest peak. When the largest peak or the difference is large, the reliability factor r is set to one or nearly one so that most or all of the error e is used to adjust the equalizer 24. However, if the largest peak or the difference is small, it is implied that the decoding of the decoder 26 is less reliable because of noise in the channel. In this case, the reliability factor r is set to a small value so that less of the error e is used to adjust the equalizer 24.

6. Grounds of Rejection to be Reviewed on Appeal

(a) Claims 60-65, 70-76, 78-82, and 84 are rejected under 35 U.S.C. §103(a) as being unpatentable over Khayrallah, et al., U.S. Patent No. 6,320,919 (hereinafter, "Khayrallah") in view of Yagyu, U.S. Patent No. 6,591,390 (hereinafter, "Yagyu").

(b) Claims 66-69, 77, and 83 are rejected under 35 U.S.C. §103(a) as being unpatentable over Khayrallah in view of Yagyu, and further in view of Molnar, U.S. Patent No. 6,567,481 (hereinafter, "Molnar

7. Argument

Argument Regarding Ground of Rejection (a)

Khayrallah shows a system 10 in Figure 1 having a transmitter 12 and a receiver 22. The receiver 22 includes an RF processor 18 and a baseband processor 20. The transmitter 12 transmits a signal, and the transmitted signal plus channel noise are received by the receiver 22. The RF processor 18 amplifies, mixes, filters, samples, and quantizes the received signal to extract the baseband signal. The baseband processor 20 processes the baseband signal.

The baseband processor 20 is shown in Figure 3 and includes a path estimator 32. The path estimator 32 includes a channel tracker 50, an impairment correlation estimator 52, and a mode selector 56.

The channel tracker 50 tracks the channel and calculates values for the taps of an equalizer 54.

The impairment correlation estimator 52 is used in the event that plural spatially separated antennas are provided for the receiver 22. The impairment correlation estimator 52 maintains a correlation matrix that estimates spatially correlated interference based on signals from these spatially separated antennas. This correlation matrix is also used in calculating the values for the taps of the equalizer 54.

The mode selector 56 switches the path estimator 32 between a training mode when known training

symbols are being received by the receiver 22 and a decision directed mode when the known training symbols are not being received by the receiver 22. When the known training symbols are being received by the receiver 22 during the training mode, the channel tracker 50 and the impairment correlation estimator 52 base their calculations on these known training symbols. When the known training symbols are not being received by the receiver 22 during the decision directed mode, the channel tracker 50 and the impairment correlation estimator 52 base their calculations on the unknown received symbols as decoded by a decoder 58.

The baseband processor 20 further includes the equalizer 54 and the decoder 58. The equalizer 54 receives both the tap values from the path estimator 32 and the received signal, and the equalizer 54 uses these tap values to estimate the symbols in the received signal. The equalizer 54 provides its output to the mode selector 56 and to the decoder 58. The decoder 58 decodes the estimated symbols, and supplies the decoded symbols back to the path estimator 32.

A further function of the mode selector 56 is to re-encode the decoded symbols and to provide the re-encoded symbols to the path estimator 32 for use during the decision directed mode.

The channel tracker 50 uses the re-encoded symbols (known training symbols during the training mode or unknown detected symbols during the decision directed mode) and the received signal to update the channel taps $c_0, \ldots, c_M$. The impairment correlation estimator 52 uses the detected symbols (known training symbols during the training mode or unknown detected symbols during the

decision directed mode) and the received signal to update a correlation matrix $R_k$.

Figure 4 of Khayrallah illustrates a slot that includes a synchronizing portion 0 to A containing the known training symbols, information portions B-C, F-G and J-K containing unknown unencoded symbols, and information portions D-E, H-I and Y-Z containing unknown encoded symbols.

During the synchronizing period of each slot, the mode selector 56 provides the known training symbols to the path estimator 32, and the path estimator 32 makes initial channel estimates in order to track the channel. These initial channel estimates are used as initial estimates for the channel tracker 50 and the impairment correlation estimator 52.

After the training sequence (i.e., after the synchronizing period), the mode selector 56 changes from the training mode to the decision directed mode. During the decision directed mode, the outputs from the equalizer 54 and the decoder 58 are used by the channel tracker 50 and the impairment correlation estimator 52. The decision directed mode continues until the next training symbol period.

Khayrallah describes its adaptive demodulation in connection with Figure 5. At a block 100, the receiver 22 receives a modulated signal and buffers a slot of the received modulated signal. At a block 102, the propagation characterization of the channel over which the received signal was transmitted is initialized using the known training symbols in the synchronization period of the received modulated signal.

At a block 104, the received modulated signal is demodulated during a first demodulation pass and the channel tracker 50 and the impairment correlation estimator 52 are updated based on the unknown symbols rather than the known training symbols. At a block 106, the detected symbols from the equalizer 54 are decoded by the decoder 58.

At a block 108, the received slot is again demodulated during a second pass demodulation. However, unlike the first pass of demodulation, during the second pass demodulation, the decoded symbols from the decoder 58 are re-encoded, and the re-encoded symbols are used to update the channel tracker 50 and the impairment correlation estimator 52.

At a block 110, the detected symbols from the second pass are decoded by the error correction decoder 58 and are provided to the user interface 36.

Independent claim 60 - Khayrallah fails to disclose decoding a code vector such that the decoding includes deriving a constellation of received signal values corresponding to the code vector, and generating a reliability factor based upon at least one of the received signal values such that the reliability factor is a measure of reliability of the decoding.

In fact, Khayrallah is completely devoid of any disclosure relating to generating a reliability factor based upon at least one received signal value such that the reliability factor is a measure of the reliability of the decoding.

The Examiner points to column 7, lines 3-12 and lines 57-64 as a disclosure of the reliability factor recited in independent claim 60.

Column 7, lines 3-12 state that re-encoded, decoded symbols are used from a first pass for calculation of an error term, that the error term is used to update the channel estimate during a second pass, and that the channel tracker 50 more accurately tracks changes in the channel response of the channel corresponding to the received signal.

This description of Khayrallah relates to the second step of demodulation in which decoded symbols instead of coded symbols are used to update the channel estimate. The error term, as is typical in receivers that estimate their channels, is based on comparing the decoded and re-encoded signal to the received signal. This error indicates the condition of the channel but provides no information about the reliability of the decoder.

Column 7, lines 57-64 state that the output of the mode selector 56 is provided to the adaptive propagation characterization estimator 32, that the mode selector 56 is provided re-encoded, decoded symbols from the decoder 58, and that these symbols correspond to the estimates of encoded information from the received signals after processing through error correction decoder 58 which are associated with particular portions of a received slot.

This description of Khayrallah also relates to the second step of demodulation in which decoded symbols instead of coded symbols are used to update the channel estimate. This description mentions nothing about generating a reliability factor as a measure of decoding reliability.

Accordingly, what Khayrallah is describing in these passages is the normal operation of a decision directed equalizer. A decision directed equalizer uses both known training symbols during a training mode and unknown decoded symbols during a decision directed mode in determining the channel estimate from which the taps of the equalizer can be determined.

When known training symbols are received, the received known training symbols are compared to a reference comprising the known transmitted values of the training symbols. The error between the received known training symbols and the reference known training symbols is used to adjust the taps of the equalizer.

When known training symbols are not being received, the unknown symbols at the output of the equalizer are decoded, and are then re-encoded so as to form a reference. This reference is then compared to the received unknown symbols at the input of the equalizer. The error between the reference re-encoded unknown symbols and the equalizer input unknown symbols is used to adjust the taps of the equalizer.

Thus, the error does not indicate the reliability of the decoder but instead is merely used to indicate the difference between the actual channel and the channel estimated by the equalizer.

On page 3 of the Final Office Action, the Examiner points to Khayrallah as a whole for a teaching of the reliability factor of independent claim 60. However, Khayrallah as a whole merely teaches using a training mode and a decision directed mode as described above for estimating the channel. Neither mode is used

to determine a reliability factor indicating the reliability of the decoder.

The Examiner points to column 3, lines 41-50, to column 11, lines 14-34, and to column 16, lines 46-59 to support the Examiner's contention that Khayrallah discloses generating a reliability factor as a measure of decoding reliability. However, these passages do not disclose generating such a reliability factor.

Column 3, lines 41-50 merely state that a multi-pass demodulation is a technique that takes advantage of the presence of coding in the communication system, as opposed to receivers that treat demodulation and decoding separately by producing hard or soft decisions and separately decoding those decisions to produce final results.

Column 11, lines 14-34 merely state that the initial channel estimates obtained by the LS estimator from the training sequence are used as initial channel estimates for the channel tracker 51 and the impairment correlation estimator 52, that the LS estimator provides an average channel estimate during the training period because the channel may change very rapidly, that it is not desirable to use the initial channel estimates to track the channel, that instead the channel tracker 50 begins tracking the channel using symbol decisions, and that, during the synchronization sequence, the channel estimator 32 typically converges to a reasonable value.

Column 16, lines 46-59 merely state that, in the case of Differential Quadrature Phase Shift Keying (DQPSK) modulation, the known bit information from the coded portions is determined from differential symbols or phase shifts between the transmitted symbols, that, while

these symbols represent the known bit information from the first demodulation pass, only the phase shift between symbols can be reliably considered known, that, consequently, the channel estimated over those symbols could actually be a channel with an offset of a $+\pi/2$, a $-\pi/2$, or a $\pi$ radian phase shift in absolute phase, and that this ambiguity in absolute phase is accommodated by interpolation.

As can be seen, these passages taken either singly or collectively merely describe using training sequences to determine the channel estimate during receipt of the synchronization portion of a frame, using symbol decisions to determine the channel estimate when the synchronization portion of a frame is not being received, and using interpolation to resolve ambiguities caused by phase shift keying modulation.

There is no mention here or in any portion of Khayrallah of generating a reliability factor as a measure of decoding reliability as required by independent claim 60.

Accordingly, Khayrallah does not disclose the reliability feature of independent claim 60.

The Examiner at least admits that Khayrallah fails to disclose a reliability factor as a measure of decoding reliability and, therefore, relies on Yagyu, particularly pointing to column 1, lines 45-50.

Column 1, lines 45-50 of Yagyu merely state that two RSC codes are alternately MAP-decoded in a turbo decoder, that the reliability of the soft output of the MAP decoder is iteratively updated, that the sign of the soft output is improved as a decoded output following a sufficient number of iteration steps, and that the

amplitude of the soft output gradually increases during the iteration process.

As can be seen, this portion of Yagyu merely states that iteration is used to iteratively increase the reliability of the soft output of the MAP decoder. There is no mention in Yagyu of actually generating a reliability factor that is a measure of the reliability of the MAP decoder. Indeed, Yagyu provides no hint to one of ordinary skill in the art of how to measure the reliability of the MAP decoder.

Consequently, because neither Khayrallah nor Yagyu provides any hint to one of ordinary skill in the art of how to measure decoding reliability, Khayrallah and Yagyu, taken either alone or in combination, would not have suggested to one of ordinary skill in the art the actual generation of a reliability factor that is a measure of the decoding reliability.

The Examiner added nothing new in the Advisory Action.

For all of the reasons given above, independent claim 60 is not unpatentable over Khayrallah in view of Yagyu.

<u>Independent claim 73</u> also recites generating a reliability factor that is a measure of decoding reliability.

As discussed above, because neither Khayrallah nor Yagyu provides any hint to one of ordinary skill in the art of how to measure decoding reliability, Khayrallah and Yagyu, taken either alone or in combination, would not have suggested to one of ordinary skill in the art the actual generation of a reliability factor that is a measure of decoding reliability.

For this reason, independent claim 73 is not unpatentable over Khayrallah in view of Yagyu.

Independent claim 79 also recites generating a reliability factor that is a measure of the decoding reliability.

As discussed above, because neither Khayrallah nor Yagyu provides any hint to one of ordinary skill in the art of how to measure decoding reliability, Khayrallah and Yagyu, taken either alone or in combination, would not have suggested to one of ordinary skill in the art the actual generation of a reliability factor that is a measure of decoding reliability.

For this reason, independent claim 79 is not unpatentable over Khayrallah in view of Yagyu.

Because independent claims 60, 73, and 79 are not unpatentable over Khayrallah in view of Yagyu, dependent claims 61-65, 70-72, 74-76, 78, 80-82, and 84 are likewise not unpatentable over Khayrallah in view of Yagyu.

In addition, dependent claim 62 states essentially that decoding reliability is determined based upon a largest of the received signal values. Khayrallah discloses only an error, and the error is determined as the difference between the received signal and the re-encoded output of the decoder 58, not based upon a largest of the received signal values.

The Examiner points to Figure 3, to column 8, lines 1-40 of Khayrallah for the features of dependent claim 62.

Figure 3 is merely a block diagram of the baseband processor 20 and does not show how any reliability is determined.

Column 8, lines 1-40 of Khayrallah state (i) that the re-encoded symbols are used for error determination, (ii) that the error determination is used in updating propagation characterization, (iii) that during the first pass of the two-pass demodulation the decoded symbols are generated and that during the second pass the decoded symbols are re-encoded to allow faster updating of the channel tracker 50 and the impairment correlation estimator 52, (iv) that accordingly an improved error rate is obtained, (v) that the output of the equalizer 54 is first de-interleaved and then fed to the decoder 58, (vi) that the decoded symbols are re-encoded, re-interleaved, and used as estimates of a portion of a received signal containing encoded information, (vii) that the re-encoded symbols may be in the form of complex numbers having both amplitude and phase components, and (viii) that the channel estimation update may be based upon the phase component.

As can be seen, this portion of Khayrallah provides no disclosure or suggestion to one of ordinary skill in the art of providing, in the system disclosed in Khayrallah, a decoding reliability factor that is based upon a largest of received signal values as recited in dependent claim 62.

Also, Yagyu provides no disclosure or suggestion to one of ordinary skill in the art of providing a decoding reliability factor that is based upon a largest of received signal values as recited in dependent claim 62.

Therefore, dependent claim 62 is not unpatentable over Khayrallah in view of Yagyu.

<u>Dependent claim 63</u> provides that decoding reliability is determined based upon a difference between two of the received signal values included in the constellation of received signal values. Khayrallah discloses only an error, and the error is determined as the difference between the received signal and the re-encoded output of the decoder 58, not between two received signal values included in the constellation that is derived during decoding. Moreover, this error is a channel estimate error, not a decoding error.

The Examiner points to Figure 3, to column 8, lines 19-42, and to column 12, lines 35-45 of Khayrallah for the features of dependent claim 63.

Figure 3 is merely a block diagram of the baseband processor 20 and does not show how any reliability is determined.

Column 8, lines 19-42 of Khayrallah state that the output of the equalizer 54 is de-interleaved and then fed to the decoder 58, and that the output of the decoder 58 is re-encoded, re-interleaved, and fed back for use by the equalizer 54 during a first demodulation pass as decoded estimates of the received signal. As can be seen, there is no disclosure or suggestion in this portion of Khayrallah of determining a decoding reliability factor based on a difference between constellation values that are derived as part of the decoding process.

Column 12, lines 35-45 of Khayrallah merely describe the error between the signal as received and the signal from the decoder 58 as re-encoded. As discussed above, this error is a channel estimate error, not a decoding error. There is no disclosure or suggestion to

one of ordinary skill in the art that this error is a measure of decoding reliability.

Also, Yagyu provides no disclosure or suggestion to one of ordinary skill in the art of determining a measure of decoding reliability.

Accordingly, because there is no disclosure or suggestion to one of ordinary skill in the art to provide, in the systems disclosed in Khayrallah and Yagyu, a decoding reliability measure as recited in dependent claim 63, dependent claim 63 is not unpatentable over Khayrallah.

For substantially the same reasons, <u>dependent claim 64</u> is not unpatentable over Khayrallah in view of Yagyu.

With respect to dependent claim 64, the Examiner discusses tap values. However tap values are the values to which the taps of the equalizer 54 of Khayrallah are set as a result of the processing performed by the path estimator 32. No difference between tap values is computed according to Khayrallah in order to provide a measure of decoding reliability. The material in column 13 of Khayrallah cited by the Examiner relates to pre-defining certain parameters of the channel tracker 50. This material has nothing to do with forming a difference that is indicative of decoding reliability.

<u>Dependent claim 70</u> recites that the received signal values in the constellation are correlation peaks. There is no description in Khayrallah of correlation or correlation peaks that are useful in determining decoding reliability.

The Examiner asserts that Khayrallah discloses a correlation estimator at column 7, lines 38-50. These

lines of Khayrallah state that the impairment correlation estimator 52 maintains a correlation matrix that estimates spatially correlated interference based on the signals from the spatially diverse antennas 16. There is no disclosure that the elements of this matrix are correlation peaks or that correlation peaks are even generated.

Accordingly, because Khayrallah and Yagyu provide no disclosure or suggestion to one of ordinary skill in the art of using correlation peaks in order to generate a decoding reliability measure, dependent claim 70 is not unpatentable over Khayrallah in view of Yagyu.

<u>Dependent claim 71</u> states that the decoding reliability is determined based upon a difference between the squares of two of the received signal values included in the constellation of received signal values.

As discussed above, Khayrallah does not disclose a decoding reliability based on the difference between two received signal values included in the constellation that is derived during decoding. Therefore, Khayrallah cannot disclose a decoding reliability based on the difference between the squares of two such values.

Similarly, Yagyu does not disclose a decoding reliability based on the difference between the squares of two received signal values.

Accordingly, because neither Khayrallah nor Yagyu provides no disclosure or suggestion to one of ordinary skill in the art of determining a decoding reliability measure as recited in dependent claim 71, dependent claim 71 is not unpatentable over Khayrallah in view of Yagyu.

Dependent claim 72 is not unpatentable over Khayrallah in view of Yagyu for similar reasons.

Dependent claim 74 is not unpatentable over Khayrallah in view of Yagyu for similar reasons as discussed above in connection with dependent claim 62.

Dependent claim 75 states that decoding reliability is determined based upon a difference between two values produced by the correlation between a received code vector and reference code vectors. Khayrallah discloses only an error, and the error is determined as the difference between the received signal and the re-encoded output of the decoder 58, not between two values produced by the correlation between the received code vector and the reference code vectors. This error is a channel estimate error, not a decoding error.

Similarly, Yagyu fails to disclose determining a decoding reliability based upon a difference between two values produced by the correlation between a received code vector and reference code vectors.

Accordingly, dependent claim 75 is not unpatentable over Khayrallah in view of Yagyu.

For substantially the same reasons, dependent claim 76 is not unpatentable over Khayrallah in view of Yagyu.

Dependent claim 78 states that decoding reliability is determined based upon a difference between the squares of two values produced by the correlation between the received code vector and the reference code vectors.

As discussed above, Khayrallah does not disclose a decoding reliability based on the difference between two values produced by the correlation between

the received code vector and the reference code vectors. Therefore, Khayrallah cannot disclose a decoding reliability based on the difference between the squares of two such values.

Similarly, Yagyu fails to disclose a decoding reliability based on the difference between the squares of two such values.

Accordingly, dependent claim 78 is not unpatentable over Khayrallah in view of Yagyu.

Dependent claim 80 is not unpatentable over Khayrallah for similar reasons as discussed above in connection with dependent claim 62.

Dependent claim 81 states that decoding reliability is determined based upon a difference between two values of a constellation of a plurality of sets of values derived from a code vector. Khayrallah discloses only an error, and the error is determined as the difference between the received signal and the re-encoded output of the decoder 58, not between two values of a constellation of a plurality of sets of values derived from a code vector. Indeed, this error is a channel estimate error, not a decoding error.

Similarly, Yagyu fails to disclose determining decoding reliability based upon a difference between two values of a constellation of a plurality of sets of values derived from a code vector.

Accordingly, dependent claim 81 is not unpatentable over Khayrallah in view of Yagyu.

For substantially the same reasons, dependent claim 82 is not unpatentable over Khayrallah in view of Yagyu.

<u>Dependent claim 84</u> states that decoding reliability is determined based upon a difference between the squares of two values of a constellation of a plurality of sets of values derived from a code vector.

As discussed above, Khayrallah does not disclose a decoding reliability based on the difference between two values produced by the correlation between the received code vector and the reference code vectors. Therefore, Khayrallah cannot disclose a decoding reliability based on the difference between the squares of two such values.

Similarly, Yagyu fails to disclose determining decoding reliability based upon a difference between the squares of two values of a constellation of a plurality of sets of values derived from a code vector.

Accordingly, dependent claim 84 is not unpatentable over Khayrallah in view of Yagyu.

<u>Argument Regarding Ground of Rejection (b)</u>

<u>Molnar</u> describes receiving data from a channel where the data is transmitted as a plurality of sequential symbols. Each symbol is determined as a function of a previous symbol and a differential symbol corresponding to a portion of the data being transmitted.

An initial differential MAP symbol estimation provides initial estimates of the differential symbols. New received symbol estimates are calculated using the initial estimates of the differential symbols. A subsequent differential MAP symbol estimation provides improved estimates of the differential symbols. Bit probability calculations are performed on the improved estimates.

The estimates of the bit values are decoded. The decoded estimates of the bit values are re-encoded as re-encoded received symbol estimates, a subsequent differential MAP symbol estimation provides further improved estimates of the differential symbols based on the re-encoded received symbol estimates, and bit probability calculations can be performed on the further improved estimates of the differential symbols.

The bits decoded by a decoder 75 are re-encoded by a re-encoder 77 to provide a new set of coherent symbols that are stored in a coherent symbol memory 95 of an equalizer 71. These new coherent symbols are used to calculate new values $r_n$ that are useful in calculating differential symbols $b_n$ according to the equation $b_n = r_n^T b_n$.

The decoder 75 performs a decoding validity check using, for example, a CRC check. In the event that the decoder 75 performs the decoding validity check on all bits, the re-encoder 77 generates new coherent symbols corresponding to all bits. In this event, all new coherent symbols are substituted for all corresponding symbols in the symbol memory 95.

However, in the event that the decoder 75 does not perform the decoding validity check on all bits, the re-encoder 77 only generates new coherent symbols corresponding to bits on which the decoding validity check has been performed. In this latter event, only the new coherent symbols are substituted for corresponding symbols in the symbol memory 95 while the other symbols in the symbol memory 95 are left unchanged.

The $r_n$ values can thus be improved based on decoding and re-encoding followed by subsequent log-

likelihood and symbol probability calculations. During these subsequent log-likelihood and symbol probability calculations, the symbol memory 95 is revised only for those symbols that do not correspond to decoded bits.

As can be seen, Molnar also does not disclose or suggest generating a reliability factor based upon at least one received signal value in a constellation of received signal values, where the reliability factor is a measure of reliability of the decoding.

Molnar does mention performing a validity check using a CRC or other error detection and/or correction technique. However, the validity check does not result in a reliability factor. It is merely used to determine which symbols in the symbol memory 95 should be changed.

Moreover, a CRC technique merely indicates whether data is correctly received, not whether data is correctly decoded. That is, a CRC is not derived from the decoding process.

Accordingly, because there is no disclosure or suggestion to one of ordinary skill in the art to provide a reliability measure in the systems disclosed in Khayrallah, Yagyu, and Molnar, one of ordinary skill in the art would not have been led by Khayrallah, Yagyu, and Molnar to the inventions of independent claims 60, 73, and 79.

Therefore, independent claims 60, 73, and 79 are not unpatentable over Khayrallah in view of Yagyu and further in view of Molnar.

Therefore, because independent claims 60, 73, and 79 are not unpatentable over Khayrallah in view of Yagyu and further in view of Molnar, dependent claims 66-69, 77, and 79 likewise are not unpatentable over

Khayrallah in view of Yagyu and further in view of Molnar.

In addition, dependent claim 66 recites that the reliability factor is generated based upon a comparison of the one received signal value to a threshold.

The Examiner pointed to column 3, lines 28-41 of Molnar for a disclosure of this feature. This portion of Molnar states that the steps of calculating new received symbol estimates and performing subsequent differential MAP symbol estimation can be repeated a predetermined number of times or alternatively can be repeated until the improved estimates of the differential symbols converge to within a predetermined threshold.

As can be seen, although this portion of Molnar does describe a threshold, the threshold relates to estimates of symbols rather than a reliability factor indicating the reliability of a decoder. Estimates of symbols do not indicate how well a decoder is decoding.

Accordingly, for this additional reason, dependent claim 66 is not unpatentable over Khayrallah in view of Yagyu and further in view of Molnar.

Dependent claim 67 is not unpatentable over Khayrallah in view of Yagyu and further in view of Molnar for similar reasons as discussed above in connection with dependent claim 62.

Dependent claims 68, 77, and 83 are not unpatentable over Khayrallah in view of Yagyu and further in view of Molnar for similar reasons as discussed above in connection with dependent claim 66.

8. Claims Appendix

An appendix containing the rejected claims is attached.

9. Evidence Appendix

There is no submitted evidence. Therefore, there is no corresponding appendix.

10. Related Proceeding Appendix

There are no related proceedings. Therefore, there is no corresponding appendix.

11. Conclusion

For the foregoing reasons, reversal of the Final Rejection is respectfully requested.

The Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to Account No. 26 0175.

Respectfully submitted,

Schiff Hardin LLP
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606
(312) 258-5500
Customer No. 28574

By: ______________________
Trevor B. Joike
Reg. No: 25,542

March 5, 2008